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ON-FARM CAPITAL FORMATION AND RURAL FINANCIAL MARKETS: RESEARCH ISSUES

by

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The past 30 years the pace of agricultural growth in many low income countries (LICs) has been remarkable. While a few nations continue to have trouble feeding all their citizens when disaster strikes, and some people lack access to sufficient calories, there are now fewer production dilemmas and more problems of inequitable distributions of purchasing power. Social scientists have contributed to this success by helping policy makers understand the importance of product and input prices, new production technology, education, and infrastructure in agricultural growth.

Several important contributors to rural development, namely on-farm capital formation and rural financial markets, nevertheless, are still poorly understood. This is largely due to the difficulties of documenting their contributions to development. While highly visible government investments in agriculture are important, especially in relatively high income countries, progress in agriculture has often depended on capital formation that occurs outside the spotlight, done in small increments by individuals or by small groups of farmers. Likewise, rural financial intermediation is difficult to document because it is usually diffused and fragmented, includes a large number of participants, and involves procedures that are misunderstood.

In the following discussion I outline research priorities on the topics of on-farm capital formation and rural financial markets. Before doing this, I clarify my use of the terms capital' and `rural financial markets,' briefly describe the intersections between these markets and on-farm capital formation, and present terse summaries of recent research on these topics.

Definitions

There are few areas in economics that involve more ambiguities than capital, largely because of the elastic definitions employed. On occasions the term capital is applied to things as disparate as money, a category of productive inputs, education and experience, and social relationships. In the following discussion I restrict my use of the term to inputs that are not entirely expended in one production period and are man-made, or grow only under husbandry. Examples include the terraced rice paddies and associated irrigation systems in many parts of Asia constructed with huge investments of human labor. Similar capital creation can be seen in Belize or Peru where colonists are attacking jungles with axe and fire to prepare land for crops or livestock. The extensive cattle herds of the Maasai in East Africa, water buffalo in Thailand, tea plantations in Sri Lanka, coca fields in Bolivia, fruit orchards in Chile, olive groves in Jordan, cocoa trees in Ghana, coconut plantations in Jamaica, rubber plantations in Malaysia, and coffee groves in Costa Rica are other examples of farm capital, mostly created by sweat-equity.

The ancient and modern irrigation systems along the Nile remind us that this capital formation has occurred for thousands of years. The hoes used by farmers in Niger the machetes wielded by Colombian farmers, the chain saws employed by Ecuadorian colonists, and cactus fences planted by Mexican farmers illustrate that capital may come in small and, sometimes, unglamorous forms

I also employ a narrow definition when discussing rural financial markets (RFMs). I use this term to denote transactions in rural areas that involve loans or deposits, done at least partly with financial instruments. While my main concern is with how formal and informal intermediaries help to facilitate finance, I am also interested in how individuals or small groups mobilize funds and make loans to each other without intermediaries.

I make a careful distinction between man-made capital and financial instruments (generalized claims on resources). In the sense I use these terms, only capital contributes directly to production. Funds or financial instruments, in turn, do not enter production directly, but may be used to purchase capital or non-capital inputs, held as assets, or converted into other assets or consumption goods. It is important to note that capital may play dual roles in a farm household; not only are these items gradually used up in production, but until they are worn out they are also assets. It is only in this latter sense of being an asset that financial instruments and capital items are similar.

Another way of distinguishing between capital and financial instruments is by the transactions costs involved in converting

them into something else. Typically, changing financial instruments into other forms involves few costs--low transactions costs are the major reason for the invention of money. In contrast, the transactions costs of converting capital items into other forms are typically relatively large. Also, the divergence between salvage value of most capital items and their use value deter decisions to covert capital items into other goods or services.

Intersections

There are major overlaps between on-farm capital formation and RFMs. Loans allow farmers to purchase large capital items sooner than they could have done if they had to save sufficient funds to make the purchase. Also, firms that can borrow to cover part of their operating costs may realize higher incomes, that, in turn, facilitate on-farm capital formation more rapidly than if loans were unavailable. Deposit services may also enhance capital formation by providing households places to store savings increments until the firm has enough money to purchase a large capital item. Further, the ability to borrow may allow firms to undertake larger and more risky on farm investments than operators would deem prudent in the absence of credit reserves (Baker).

On a more aggregate scale, efficient financial markets facilitate capital formation in rural areas through helping to allocate resources more efficiently; surplus operators who expect low marginal rates of return to investments in their operations can make deposits with financial intermediaries, who, in turn, can

lend these funds to individuals who expect high returns from further investments, but have too little cash to act on these opportunities. The more efficient allocation of resources that results increases incomes of both saver and borrower and thus enhances their abilities and incentives to make further investments.

While financial markets play a significant role in on-farm capital formation where farmers buy and sell a large part of their inputs and products, it is important to remember that self-finance often dominates on-farm capital formation. This is especially true when RFMs are rudimentary and where these markets are severely repressed. It is too often forgotten that humans have made immense investments in irrigation systems, clearing of land, in livestock, in terracing, in buildings, and in equipment without the assistance of formal financial systems and government credit programs.

Before leaving this topic, it is useful to briefly critique a spurious intersection between farm capital and RFMs: the claim that a low interest rate on formal loans induces farmers to substitute capital (machinery) for labor. While often mentioned in development literature as the main adverse effect of cheap agricultural loans, on careful analysis this appears not to be the case for two reasons.

First, most farmers in LICs operate in fragmented financial markets that have real interest rates on loans ranging from highly negative to highly positive. There is no a priori reason to

conclude that one of these interest rates--the concessionary rate charged on a formal loan--dictates the subjective discount rate applied by the borrower to the future stream of benefits expected from an investment in machinery. (If this were true, it would imply that high interest rates cause farmers to substitute labor for capital). Even if there were a one-to-one relationship between an interest rate on a loan and a borrowers' subjective discount rate, what discount rate would an individual use who has two loans, one with a low interest rate and the other a high rate? One answer is that, in fragmented financial markets especially, interest rates on individual loans have no direct tie to a borrower's subjective discount rate.

Second, financial instruments are highly fungible (interchangeable); a borrowed unit of currency is identical to one owned by the borrower. Further, almost all farmers in LICs have multiple sources and uses of liquidity. Thus, one should not conclude that marginal changes in use of borrowed liquidity are highly correlated with the justification given for the loan. Most borrowers have the option of exercising financial substitution, even if the intent of a loan is to buy machinery. Part of this substitution may involve hiring more labor. Given this, it is not clear why a change in the price of one source of liquidity--the interest rate on a formal loan--would alter the relative desirability of two possible uses of liquidity: e.g., purchasing machinery compared to hiring more labor. Interest rates have no direct effect on the marginal returns expected from labor or

capital and, therefore, have little or no direct effect on factor use proportions by borrowers.

If concessionary interest rates on formal loans affect factor-use proportions, it is more likely an indirect relationship. That is, low interest rates induce lenders to concentrate loans in the hands of borrowers who have the most secure collateral and those who impose the lowest transactions costs on the intermediary (Gonzalez-Vega). If these preferred borrowers happen to use a higher ratio of capital-to-labor than do those potential borrowers rationed from the market by the low interest rates, then the overall ratio of capital-to-labor will increase.

Research on Capital Formation

Farm capital is difficult to analyze for at least five reasons. First, complications are encountered because capital items are heterogeneous and difficult to value. This causes serious aggregation problems. What value does the researcher assign to a capital item that can only be sold for less than its acquisition price, but is worth more for production purposes than its salvage value? Second, some capital items such as housing and vehicles are used both for production and consumption. Third, some capital formation occurs in qualitative changes. How does a researcher measure and evaluate changes in soil productivity enhanced through drainage, fertility improvements, weed control programs, or removal of stones? How should changes in human capital be measured when they occur largely through experience

gained from trial and error? Fourth, when is a capital item held by the farm operator because it is a desirable asset, rather than because of its direct contribution to production? And fifth, how can the researcher keep the costs of collecting data within reasonable bounds when farmers are often reticent--or unable -to reveal a complete inventory of their capital and assets, and when study of capital formation is best done with costly time series information or panel data?

These problems have dissuaded most researchers, in both high as well as low income countries, from doing comprehensive studies of this topic. Exceptions to this are extensive farm surveys carried out by Brazilian and US academics during the early 1970s in Southern Brazil (Adams and others), a handful of case studies by anthropologists (e.g., Firth and Yamey), and interesting work by agricultural economists in Japan (e.g., Izumida).

It has been more common for researchers to do partial analyses of single types of farm capital such as machinery, irrigations systems, human capital, livestock, perennial crops, buildings, and land quality changes. Also, it has been more common for researchers to do cross sectional studies and treat capital generation as an event, rather than to collect time series or panel data that would allow analysis of the process of capital formation. Because of the lack of data, researchers have often been forced to study the contribution of capital and technological change by looking at unexplained residuals.

Research Agenda on Capital Formation

While the make up of farm level capital, how it evolves over time, and the contributions it makes to overall development are interesting intellectual questions, answering these questions exceeds the patience and resources available to most researchers, especially in LICs. Researchers will be forced to continue to limit their analysis in this area to partial studies that are most interesting to policy makers. If it is important to demonstrate that substantial amounts of on-farm capital formation occur, and to show that it makes an important contribution to development, representative case studies may be more realistic research tools than are large surveys. While not satisfying intellectually, those who are interested in the overall process of on-farm capital formation must accept this process as largely taking place in a black box.

Instead of attempting to measure on-farm capital formation or to document its contribution to development, researchers will be forced to focus on how to speed investments in particular capital items and assessing whether it is desirable to do so. This will include documenting the impact of important economic policies on these investments. The bulk of the research, therefore, will be on some particular capital form and on particular conditions or policies that affect these investments by farmers.

The capital forms that receive priority in a given country will be highly time and place specific. For example, in the late 1960s and early 1970s tubewell irrigation in many parts of South

Asia was an important part of capital formation and merited substantial research. In contrast, in the late 1980s the Peoples' Republic of China was making major decisions on farm mechanization, considerations that could have benefited from systematic analysis. Still other countries such as Haiti, many nations in Africa, and Nepal need to encourage more on-farm investments to slow the ravages of erosion; research might provide assistance in making these decisions.

Because of the possibilities of labor substitution as well as complementarities, farm machinery will likely be a high priority research item in many LICs. It is also clear that improvement in, and extension of, irrigation systems will be necessary to sustain growth in agricultural output in many countries. Likewise, investments in conservation practices will be necessary in almost all LICs if our generation is to pass on to the next land and water resources that sustain rather than hobble development. Many farmers will also need to expand their livestock herds, plant more tree crops, and learn modern farming practices if those who people the 21st Century are to be fed and clothed better than those of the 20th Century.

It is easier to identify the conditions and policies that merit research priority when it comes to stimulating on-farm capital formation. On a broad scale it is largely the ability and willingness of farmers to make farm investments that determine the pace of farm level capital formation. Ability to invest is strongly influenced by farmers' income, ability to borrow funds or

resources, and education and experience. The willingness to invest, in turn, is largely conditioned by the returns farmers expect from additional investments in on-farm capital. Expected prices of products and inputs, yield expectations, risk considerations, and subjective discount rates applied to the expected benefits from the investment are additional considerations. Insecure land title and tenure can also have a major impact on the willingness of farm operators to make investments. Where this is a problem it merits special research attention.

As suggested earlier, RFMs facilitate on-farm capital formation and in many countries credit projects are the major instrument used by governments and donors to stimulate investments in machinery, tree crops, livestock, irrigation, conservation, buildings, and even education. Credit projects are frequently accompanied by sizeable subsidies through concessionary interest rates, capital grants, toleration of loan defaults, and free training. Recent research has shown that many of these projects have not worked as intended, that formal RFMs are not efficient, and that they are distributing their services and subsidies inequitably. It has become increasingly clear that RFMs can only bolster development in general, and on-farm capital formation in particular, if they operate more efficiently and equitably, a subject to which I now turn.

Research on RFMs

RFMs in low income countries have increasingly drawn the attention of researchers, especially since the late 1960s. Even prior to that, a few substantial studies were done on the structure of rural credit markets, especially in Asia. Increased RFM research resulted from large government- and donor-sponsored farm credit programs initiated during the 1960s-1970s, attempts to create new farm credit organizations, and from efforts to substitute formal loans for informal borrowing. In some countries, farm loans became the main tool for promoting rural development. These programs were usually targeted at accelerating the use of modern technology and increasing on-capital formation. Much of the research associated with these efforts was either in the form of credit-impact studies aimed at documenting borrowers' benefits from expanded loan use, or studies to uncover exploitation by informal lenders.

By the early 1970s it become clear that many of these credit programs had serious problems and that much of the research done was of limited use in forming solutions. This was documented in a worldwide review of small farmer credit programs conducted by the Agency for International Development during 1972-73 (Donald), and reinforced by an FAO sponsored conference in Rome on agricultural credit in 1975. Major problems included extensive loan defaults, concentration of concessionary priced loans in the hands of borrowers who were relatively well off, few rural people with access to formal financial services, credit programs that were not

self sustaining, few deposits mobilized in rural areas, and growing doubts about how effective loans were in stimulating investments and output.

During the 1970s research on RFMs began to evolve from credit-impact studies and attempts to document exploitation by informal lenders, to paying more attention to the overall performance of RFMs, positive aspects of informal finance, and deposit mobilization. This involved a change in the focus of research from what farmers did with additional funds provided by a loan, to understanding the behavior and services provided by financial intermediaries. These research trends continued during the 1980s, but additional stress was also placed on the transactions costs involved in various aspects of rural financial intermediation.

RFM Research Agenda

Policy makers and researchers who specialize in RFMs have somewhat different concerns. The policy maker tends to worry about immediate problems; while interests of researchers are longer run, more basic in nature, and revolve around understanding how RFMs work. A research agenda that addresses some of the policy makers concerns (so they will fund the research), and, at the same time, also furthers the interests of researchers might be done best through the use of a research matrix.

Because financial markets are interwoven, it is important that this matrix reflect the most important aspects of these markets, of which there are at least three. The first dimension

is made up of the three layers of participants in RFMs: individual borrowers and savers, financial intermediaries, and policy makers. The second dimension divides financial activities into those carried out by formal intermediaries (regulated) and those conducted in informal markets (unregulated). The third dimension further subdivides the above into loan and deposit issues.

This matrix recognizes the intimate relationship between policy, intermediary behavior, and financial services. Likewise, it acknowledge that formal and informal finance are entwined, and that deposits and loans are often mirror images of each other. The matrix also encourages researchers to view RFMs as linked parts, rather than as a series of independent credit projects. It further highlight the importance of considering deposit mobilization along with lending.

Placing previous research into this matrix allows identification of gaps in analysis. For example, prior to 1970 most RFM research focused on the borrower-saver dimension, with some analysis on intermediaries, but largely ignored deposits. During the 1970s more research emphasis was given to the policy making dimension and to deposits. In the 1980s informal finance and research on intermediary behavior and performance has receive much more attention, along with study of the performance of the overall system.

RFM problems and policies in many LICs are surprisingly similar. This results in a relatively small number of research issues that are of interest to a large number of policy makers as

well as researchers. Five candidates for this list are: (1) Documenting the transactions costs involved in RFMs and their distribution among the participants in these markets. This includes studying how new financial technologies and changes in policies affect these costs. (2) Explaining why some rural people have access to formal loans and deposits while others do not. (3) Understanding what causes formal loan recovery problems. (4) Studying how deposit mobilization affects the performance of RFMs. And, (5) analyzing the financial services provided by various forms of informal finance in order to design more desirable formal financial systems. A few additional comments on each of these topics may show why they are likely to be of interest to both policy makers and researchers.

Transactions costs show the amount of financial friction in RFMs and are, perhaps, the best measure of the overall efficiency of a financial system. Studying the allocation of these costs among participants also provides insights into how financial services are rationed. Currently, some students of RFMs are arguing that major reductions in these costs will be necessary before formal financial markets can service--on a sustained basis--many of the rural people who now do not have access to formal loans or deposit accounts. Systematic study of transactions costs can give policy makers and managers of financial institutions useful insights into the costs of their program and projects, and at the same time, allow researchers to gain fundamental insights into the operations of RFMs. Transactions costs for a doctor of

financial systems are analogous to the blood pressure taken by a physician as a measure of a person's health. Each measure tells a lot about the general health of a patient, be they a person or an RFM.

The proportion of rural individuals and firms who can borrow from, or deposit surpluses in, a formal institution is an excellent proxy for the extent to which RFMs assist in allocating resources efficiently. A repressed or underdeveloped financial system reaches only a few of the individuals who can productively use formal loans. A severely repressed financial system does a particularly poor job of connecting surplus households and firms to a system that facilitates resource reallocation. Increasing the number of rural people, especially the poor, who have access to formal loans is a primary policy objective in many LICs. Clarifying why financial markets are slow to embrace new customers in rural areas provides fundamental insights into how these markets operate and also has important short-run policy implications.

Defaults on agricultural loans made from government or donor funds are a major concern of policy makers in a number of LICs. Chronic defaults drain government budgets and also undermine the ability to sustain government sponsored credit programs. In a fundamental sense, loan recovery reflects the quality of the relationships between borrowers and lenders. Chronic recovery problems indicate an inability on the part of the lender to verify creditworthiness, that politics are heavily involved, or that

borrowers find their relationships with lenders are unsatisfactory and decide to seek a "divorce" through the expediency of default. Even worse, defaults destroy one of the most important products of financial intermediation: sustained working relationships between borrowers and intermediaries.

The past few years an increasing number of governments have been unable to sustain previous levels of funding for agricultural credit programs. This problem has been reinforced by the declining willingness of donors to provide loans for government credit efforts. This has forced some government institutions to place more emphasis on mobilizing deposits in rural areas. At the same time, a few researchers have been arguing that RFMs would operate more efficiently and equitably if their deposit-to-loan ratios were increased substantially. This ratio shows the extent to which RFMs are self funded, or conversely, the extend to which they are dependent on outside funds. Outside funds may impose substantial additional costs on RFMs, open them to political intrusions, and seduce them into ignoring deposits. RFMs that have high loan-to-deposit ratios appear to perform better with respect to transactions costs, loan recovery, and proportion of rural population serviced than do those systems with low ratios.

As suggested earlier, policy makers have traditionally been interested in informal finance only in a perverse way of seeking its demise, particularly in South Asia. Recent research, however, is suggesting that some forms of informal finance in rural areas provide financial services efficiently. Also, some rural people,

especially the poor, find that informal financial services are more valuable to them than are government sponsored programs. The popularity of informal finance in rural areas and high rates of loan recovery in these systems are signs of this. Analysis of informal finance can provide valuable information on the types of financial services that many people are demanding, along with insights into arrangements and technologies that people informally develop to keep the costs low of providing these services.

Concluding Comments

Farm level capital formation and rural financial markets in LICs are some of the most difficult research topics that social scientists treat. Both processes occur over wide geographic areas, include a large number of participants, and involve activities that are costly and tedious to substantiate. These research problems are exacerbated by fuzzy thinking about what capital is and what financial markets do. While these two sets of activities do intersect, they are vastly different processes and ought to be treated that way by researchers.

It will be extremely difficult to document the overall contribution of farm-level capital formation to development. In addition, few policy makers are willing to pay for this type of research. Those who are interested in this process must gain insights into it through case studies and through analyses of those types of capital that policy makers are attempting to promote.

Opportunities for doing useful research on RFMs are more promising. Additional analysis should focus on understanding why RFMs operate inefficiently and also limit their services to such a small part of the population. Because politics is often involved in credit programs, those doing RFM research must be sensitive to the risks and opportunities this entails.

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